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DIOPHANTINE ANALYSIS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTION TO THE CELEBRATED INDETERMINATE EQUATION.

$x^2-Ny^2=\pm1.$

By A. H. BELL, Hillsboro, Illinois.

[Continued from the March Number.]

No. 5. Example: Given $x^2-94y^2=1$. Required x and y.

This is the *most difficult number* under a 100. Proceeding in the usual way we have,

No. Term	1	2	3	4	5	6
			+3			
$m=$	2 +	1	4	7	10	13
			+29			
$n=$	10 +	10	39	68	97	126
1st series of Diff.	+15	−6	−17	−18	−9	+10
D_1.	−21	−11	−1	+9	+19	
D_2.	+10....					

Preliminary for extending the series, because −9 and +10 are nearly of a size.

$3+10^{+13}\ 23$
$29+97^{+126}\ 223$
$+5-9-3$
D_1-14+6
D_2+20

We proceed with the two last convergents and commence a new series.

2nd series No. Terms			3	4	5	6	7	8
		+23						
$m=$	19 +	13	36	59	82	105	128	151
		+223						
$n=$	97	+126	349	572	795	1018	1241	1464
Diff.	−9	+10	+23	+30	+31	+26	+15	−2
D_1	19,	+ 13,	+7	+1	−5	−11	−17	

giving $y=221064$.
$y^2=48869292096$

$x=2.143,195.$

$D_2=--6$ .... $x=\frac{151\times94\times151\times1464}{1464}+1.$

$x^2=4583713457025$

Proof $\left\{\begin{array}{l}2143295^2 \qquad 94\times221064^2\\ 4593713457025-4593713457024=1\end{array}\right.$

These are the least values that can be found for x and y.

(TO BE CONTINUED.)

SOLUTIONS TO PROBLEMS.

3. **Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburg, Logan County, Ohio.**

It is required to find three whole numbers in an arithmetical progression, such that the sum of every two of them shall be a square.

III **Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.**

Represent the required numbers by $\frac{1}{2}x^2-(2x+1)$, $\frac{1}{2}x^2$, and $\frac{1}{2}x^2+$

$(2x+1)$; then must $x^2-(2x+1)$, x^2, and $x^2+(2x+1)$ be squares. Now, all we have to do is to find a value of x that will render $x^2-(2x+1)$ a square.

Put $x^2-(2x+1)=(x-p)^2$; then

$$x=\tfrac{1}{2}(p^2+1)\div(p-1).$$

Put $p=2$, then numbers are:—46, +50, +146;
" $p=8$, " " " : 386, 8450, 16514;
" $p=9$, " " " : 482, 3362, 6242;
" $p=10$, " " " : 4562, 20402, 36242;
" $p=11$, " " " : 2162, 7442, 12722.
&c. &c. &c.

PROBLEMS.

11. **Proposed by ARTEMAS MARTIN, LL. D., U. S. Coast Survey Office, Washington, D. C.**

Find three whole numbers such that the square of the sum of any two of them diminished by the square of the other number shall be a square.

12. **Proposed by H. W. DRAUGHON, Clinton, Louisiana.**

Find three numbers such that, the sum of their cubes may be a square, and the sum of their squares a cube.

Solutions to these problems should be received on or before July 1st.

AVERAGE AND PROBABILITY.

onducted by B. F. FINKEL, Kidder, Mo. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

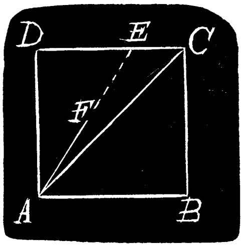
3. **Proposed by MISS LECTA MILLER, B. L., Professor of Natural Science and Art, Kidder Institute, Kidder, Missouri.**

A deer, wounded at the corner of a square park, is equally liable to run in a straight line in any direction, from the corner of the park, and, at the same time, is also liable to drop dead before running a distance equal to the diagonal of the park. What is the chance that the deer will drop dead in the park?

I. **Solution by Professor G. B. M. ZERR, Principal of High School, Staunton, Virginia.**

Let $ABCD$ be the square park, side unity; $AF=r$; $\angle EAB=\theta$.

Then $AC=\sqrt{2}$, $AE=\text{cosec}\theta$



$$\therefore \text{chance}=p=\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\int_0^{\text{cosec}\theta} rd\theta dr \Big/ \int_{\frac{\pi}{4}}^{\frac{5\pi}{4}}\int_0^{\sqrt{2}} rd\theta dr.$$

$$p=\frac{1}{\pi}\int_{\frac{\pi}{4}}^{2}\int_0^{\text{cosec}\theta} rd\theta dr=\frac{1}{2\pi}\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\text{cosec}^2\ \theta d\theta=\frac{1}{2\pi}.$$